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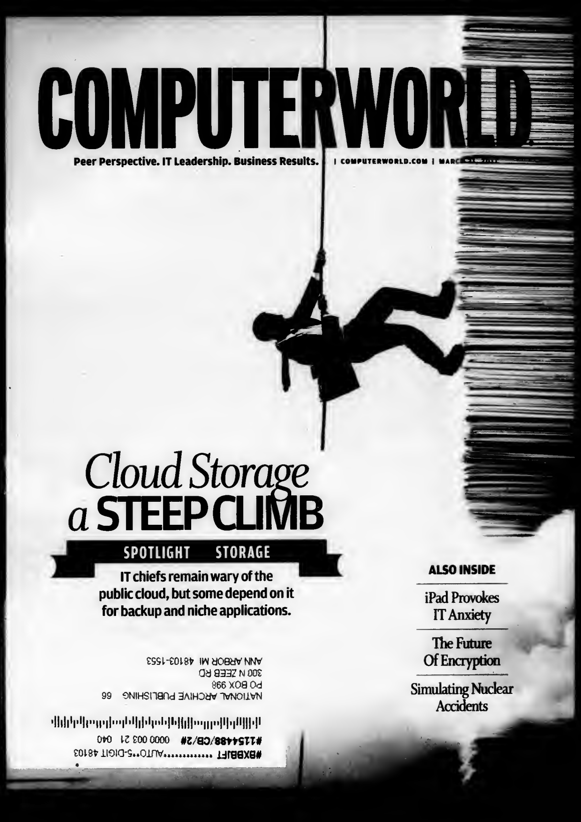

Cloud Storage a STEEP CLIMB

SPOTLIGHT STORAGE

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ALSO INSIDE

iPad Provokes IT Anxiety

The Future Of Encryption

Simulating Nuclear Accidents

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20 Organizations in industries such as healthcare, finance, manufacturing and media are as concerned as ever about data security and privacy, but they aren't shying away from cloud storage.

The Elusive Storage Utopia

28 The ability to put data online and then retrieve it from the same device decades later would amount to storage Utopia. In five years or so, that may be more than a dream.

The Clock Is Ticking for Encryption

32 The nature of cryptography could be seriously altered by the arrival of quantum computers in 20 years – which is right around the corner in the world of cybersecurity.

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SPOTLIGHT | STORAGE

FELLOW
UART PARKIN
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THE ELUSIVE STORAGE UTOPIA

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HeadsUp

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IT GOVERNANCE

Wanted: Tech-Savvy Board of Directors

CORPORATE BOARDS OF DIRECTORS should devote as much attention to IT matters as they do to accounting rules, but they rarely do, according to a report released earlier this month by the Deloitte Center for Corporate Governance.

Today's companies need "tech-savvy directors" who can make sure the IT strategy is aligned with the overall strategic plan, as well as monitor the various risks associated with IT, the report said.

"The growing complexity and pervasiveness of IT is increasingly making IT literacy an essential competency for directors," the Deloitte Center report said. Boards should give as much scrutiny to a major IT project as they would to any other major capital expenditure, it noted.

But most directors acknowledge that they don't spend enough time on IT oversight, perhaps because they aren't comfortable with technology, according to the report. The board of directors at FedEx is one of the few to have an IT oversight subcommittee, noted David Zanca, FedEx's senior vice president of IT, at *Computerworld*'s recent Premier 100 IT Leaders conference.

The Deloitte report suggested that CIOs could educate their boards about IT strategy and risks — using business language, not technical jargon — at a dinner before board meetings.

In addition, Deloitte said CIOs could boost the technical literacy of directors by providing a secure "board portal" or dashboard that has key documents, metrics and data analytics to support decision-making.

– Mitch Betts

DATA ANALYTICS

Hadoop Goes Mainstream For Big BI Tasks

Corporate efforts to glean business intelligence from the massive volumes of data generated by Web server logs and social media have led to a surge of interest in open-source Hadoop software.

Hadoop is designed to process terabytes and even petabytes of unstructured and structured data. It breaks large workloads into smaller data blocks that are distributed across a cluster of commodity hardware for faster processing.

The technology – already used by Web giants such as Facebook, eBay, Amazon and Yahoo – is increasingly being adopted by banking, advertising, biotech and pharmaceutical companies, said Stephen O'Grady, an analyst at RedMonk.

Tynt Multimedia, a Web analytics firm that collects and analyzes nearly 1TB of data per day, switched to Hadoop about 18 months ago when its MySQL database system began collapsing under the sheer volume of data it was collecting, said Cameron Befus, Tynt's vice president of engineering.

Relational database systems are good at data retrieval and queries but don't accept new data quickly.

"Hadoop reverses that. You can put data into Hadoop at ridiculously fast rates," Befus said. But Hadoop requires programming tools such as Pig or Hive to write SQL-like queries to retrieve the data.

– JAIKUMAR VIJAYAN

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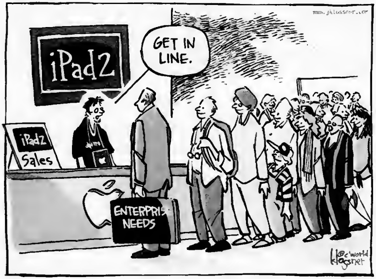
HOW CAN WE HELP YOU?

BETWEEN THE LINES

By John Klossner



MERGERS & ACQUISITIONS

How to Integrate a Business in 90 Days

IT SOUNDS IMPOSSIBLY FAST. But $23 billion electronic components distributor Avnet can usually bring acquired companies into the fold — including IT systems — within 90 days.

Avnet CIO Steve Phillips explained the process at *Computerworld*'s Premier 100 IT Leaders conference this month. The Fortune 500 company has grown via numerous acquisitions, including three just last year.

Phillips said Avnet has an acquisitions playbook — actually a SharePoint site — that serves as a repository of everything Avnet has learned through more than 60 acquisitions. It includes checklists, processes and best practices for integrating all parts of the business, with a particularly thick section on IT.

The CIO urged companies to "document your tribal knowledge" and be sure to update the playbook after each deal.

Phillips said Avnet works with "deliberate speed" because a drawn-out process is a major drag on employee productivity — he called it a "deep freeze" — and Avnet wants to minimize the amount of time the two companies are operating differently, on separate IT systems. Besides, faster integration means a quicker payoff from the acquisition, he said.

A key element of Avnet's M&A strategy is to "ease the pain" of the people involved, Phillips said. "It's really important to be respectful and humble" when communicating with the acquired company's employees, he said. They want to know, "What's my future? Will I be with this company or not?"

Avnet determines which IT employees will be in the "go-forward organization" and which ones will be in the "transition organization" but then leave once the integration is done.

Ultimately, "we pick the best of the best" systems, applications, processes and people, Phillips said, regardless of which company they come from. Phillips himself came from Memec, which Avnet acquired in April 2005. He had been Memec's CIO.

– *Mitch Betts*

Micro Burst

Market researchers say there were a total of

7.9 billion

downloads from all mobile application stores last year.

MOBILE & WIRELESS

iPad Triggers Spending for Wi-Fi Networks

The rising popularity of tablets and smartphones has boosted sales of Wi-Fi equipment to new highs as companies upgrade their wireless networks, analysts reported earlier this month.

Worldwide sales of wireless LAN equipment rose to $769 million in the fourth quarter of 2010, up 28% from the same period in 2009, according to Infonetics Research. Research firm Dell'Oro Group reported that for the full year, wireless network revenue jumped 25%, surpassing $5 billion.

The wireless LAN market has changed more in the past six months than it did in the preceding six years, mostly because of Apple's iPad, said Roger Hockaday, a marketing director at vendor Aruba Networks.

Having an office Wi-Fi network was once viewed as merely a convenience for guests, but the influx of iPads is making it more of an IT necessity, Hockaday said.

Also, now that people carry iPads with them and connect in various places in an office building – not just in meeting rooms and at their desks – companies have to rethink their network architectures and cover more areas of their buildings, Hockaday added.

MIKAEL RICKNAS,
IDG NEWS SERVICE

BETWEEN THE LINES

By John Klossner

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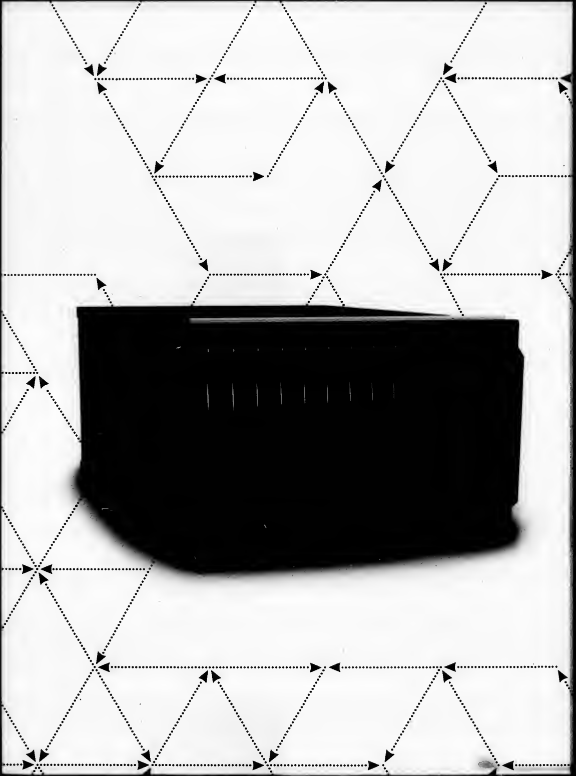

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Customers stand in line outside Apple's flagship Fifth Avenue store in New York to purchase iPad 2 tablets on March 11.

REUTERS / LUCAS JACKSON

NEWS ANALYSIS

iPad 2 Provokes Anxiety in IT

IT executives worry that corporate workers adopting the new consumer technology will expect support right away. By Matt Hamblen

AS CONSUMERS AND BUSINESS USERS flocked to buy the new iPad 2 earlier this month, some IT executives were cringing.

Apple's latest tablet is faster, thinner and lighter than its predecessor — and includes two cameras and other new features and apps that IT managers say will lure many corporate workers to use it in their jobs.

Thus IT personnel know they will have to devote significant time to supporting yet another popular consumer device.

"I have coined this 'the tyranny of consumerization,'" said Dave Codack, vice president of employee technology and network services at TD Bank Financial Group. "The enterprise is not dictating technology with these devices; the revolt is coming from the end-user community."

Codack's group, which supports some 81,000 workers, is already testing the original iPad device for various business uses while laying plans to test the iPad 2 and the soon-to-ship BlackBerry PlayBook tablet from Research In Motion.

Codack says he's no Luddite and notes that TD Bank's IT staffers "seem to be excited" about the iPad 2's new dual camera, dual processor and improved graphics.

"With employees using these devices in their day-to-day lives, it's inevitable they will expect enterprise support to eventually bridge these two worlds," he added.

Analysts say that companies face huge challenges because the iPad 2 was not made with IT operations in mind.

"Apple did not address this at all with iPad 2," said Jack Gold, an analyst at J.Gold Associates. "I think they missed an opportunity."

Gartner analyst Ken Dulaney added that Apple encourages businesses to adopt iPads but "has no intention of becoming a Dell, an HP or Lenovo as far as enterprise support."

Jude Olinger, CEO of The Olinger Group, a broad user of first-generation iPads, said the iPad 2 offers potential workplace benefits but also presents IT support challenges.

The market researcher bought 284 first-generation iPads last April to conduct shopper surveys at 134 U.S. malls.

Olinger now plans to buy 20 iPad 2 tablets, partly to see whether the new two-way FaceTime video chat capability can enhance the process of conducting surveys remotely.

Any benefits would be at least somewhat offset by Apple's lack of iPad support, which had slowed the research firm's initial iPad deployment process, Olinger said.

"The hardest thing with the original iPads was to activate nearly 300 machines at one time," he said. "[The] four people working activations could only get 40 done a day.

"If Apple could get their enterprise [act] together, they could give Microsoft a run for their money," Olinger added. "They are backing into the enterprise."

Gold suggested that RIM's BlackBerry PlayBook tablet could be a good fit for companies concerned about Apple's level of support.

"End users love the concept of iPad," Gold concluded. "But IT ultimately has to deploy and pay for ongoing device maintenance and control. This is a real cost that users don't usually appreciate." ◆

If Apple could get their enterprise [act] together, they could give Microsoft a run for their money.

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Japan's Fukushima Daiichi nuclear plant is seen burning on March 14, after a blast that occurred in the wake of the March 11 earthquake and tsunami.

NRC Aims to Meet Japan-like Challenge

Scientists are working to find out how U.S. nuclear plants would fare during a disaster.

By Jaikumar Vijayan and Patrick Thibodeau

MONTHS BEFORE the nuclear disaster started to unfold in earthquake- and tsunami-ravaged Japan, scientists in the U.S. started a project using the latest computing technology and complex modeling software to better determine potential consequences of such calamities at nuclear plants in this country.

The 9.0 magnitude earthquake on March 11 caused heavy damage at multiple Japanese nuclear plants, and fires and explosions led to the release of radiation into the atmosphere, forcing the government to expand evacuation areas and prepare to deal with thousands of potential victims.

Concerns escalated sharply last week as engineers in a country known for its expertise in nuclear technology scrambled to avert full-scale meltdowns in power plants near the quake's epicenter.

For about 25 years, researchers from the U.S. Nuclear Regulatory Commission have been engaged in projects to better understand how a nuclear reactor would behave in a severe accident, and get an idea of the potential consequences of a release of radioactive plumes.

> **MELCOR code analyzes severe accidents in nuclear power plants,** [the] progression through core melting should inadequate cooling be available, and the release to the environment should containment systems fail.

The agency sent several of its nuclear experts to Tokyo last week to provide assistance to Japanese officials.

The latest NRC project, dubbed State-of-the-Art Reactor Consequence Analyses, or SOARCA, seeks to "realistically estimate" the overall effect of a leak of radioactive material.

Launched late last year, SOARCA expands on earlier projects by using the latest computing resources and complex modeling software to generate more accurate and realistic accident simulations, say NRC officials.

The SOARCA project uses a pair of modeling tools developed by the U.S. Department of Energy's Sandia National Laboratories: MELCOR (Methods for Estimation of Leakages and Consequences of Releases), which models the "progression of severe accidents in light-water reactor nuclear power plants"; and MACCS2 (MELCOR Accident Consequence Code Systems 2), for studying the potential health implications of an accident involving radiation leaks, said Randall Gauntt, manager of Sandia's severe accident and consequence assessment department.

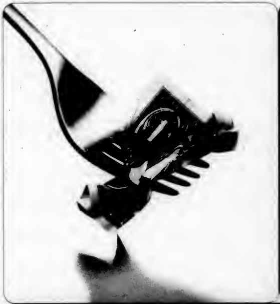
"MELCOR code analyzes severe accidents in nuclear power plants, [the] progression through core melting should inadequate cooling be available, and the release to the environment should containment systems fail," Gauntt said.

Meanwhile, the Southern California Earthquake Center, a consortium of more than 60 universities worldwide, has been using the U.S. government's most powerful supercomputers to examine the probabilities of earthquakes and the damage they could cause.

Thomas Jordan, director of the center, said its researchers estimate a 99% probability that a magnitude 6.7 or larger quake will hit California sometime during the next 30 years. Jordan told *Computerworld* that high-performance computing systems don't have the ability to predict such an event, but he added that work is under way to improve forecasting.

A 7.2 magnitude earthquake in Japan that occurred on March 9 is now considered a foreshock, but had it not been for the subsequent 9.0 magnitude quake, the earlier tremor would have been considered the primary seismic event, Jordan said. ◆

REUTERS / HO NEW



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THE Grill

W. Craig Fugate

The FEMA chief wants to use mobile technology to customize alerts during a disaster.

The most interesting thing people don't know about you: I kayak.

The riskiest thing you ever did: I went kayaking during a tropical storm in Florida. I was very foolish.

Your favorite vice: Coffee. Large quantities of it. My staff limits my intake when I have to do public speaking or they can't get me to shut up.

Your favorite technology: Digital cameras.

Your personal philosophy: Live in the moment. I don't worry about the past, and I can't do much about the future. All I can do is what I'm doing right now. In a disaster, that's just about the only way to maintain your sanity.

FEMA / BILL KOPLITZ

BEFORE BECOMING *administrator for the Federal Emergency Management Agency in May 2009, Craig Fugate was a customer. As director of the Florida Division of Emergency Management, he oversaw the state's response to many hurricanes. Since coming to FEMA, he has responded to disasters such as the tsunami in American Samoa and the massive floods in Tennessee last year. Fugate spoke recently about the need for emergency data feeds, how social media can play a role in disaster response, and his vision of a future that includes a proactive, location-based warning system that contacts cell phone users in harm's way and provides detailed instructions on what to do.*

In what ways does FEMA use IT to accomplish its mission? We're trying to change the way we're using technology. A lot of the things we were doing are no longer relevant, particularly when we look at things like GIS. For a long time, the attitude here was,

Continued on page 16

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FEMA / AARON SKOLNIK

> **We're trying to figure out how to get into conversations with the public** without getting into one-on-one transactions, which would be next to impossible.

Continued from page 14

"Well, we use GIS to print maps." You have to change the mindset of the managers that the tools are a lot more powerful than that. That's where we are now, just getting people to understand it.

We have a Web page, but what good does it do in a disaster if people don't have Web access? But they may have a smartphone. So we did a mobile Web page last year. It's really a simple page. If you're in a disaster area, you don't want to see our org chart and you don't care about our mission statement. What you want to do is find the information pertinent to the event and how to prepare against that threat. So we did a very stripped-down, low-bandwidth page that has pertinent headline information about the big event that's occurring.

FEMA is now pushing out information through social media channels such as Twitter, Facebook and a blog. Are you looking to have a conversation with people during a crisis, or just feed them information? We don't have answers, but we can't wait for answers. Nobody has come up with a blueprint that says this is how social media must and will be used in all disasters, because it changes fast. We're trying to figure out how to get into conversations with the public without getting into one-on-one transactions, which would be next to impossible.

Is everyone at FEMA on board with social media? We still run into the naysayers who say you can't trust the public, you can't do this, you'll have bad outcomes. I've always looked at it the other way: It's going to happen, and you need to deal with it.

Are you planning to use cell phone signals to locate victims of future disasters in the U.S.? Yes. One of the lessons learned in Haiti was that a lot of survivors were merely trapped in the rubble. They weren't injured, but they were trapped for relatively long periods of time — far beyond what we had seen in many other types of earthquakes. But if you have cell signals, you've got a better chance.

How can FEMA use technology to be more proactive? Two things are happening. One is the evolution of the emergency alert system under the Integrated Public Alert and Warning System. It's in the implementation phase, and commercial cell phone providers will have to provide emergency alert warnings to customers based on the geographical location of those warnings. FEMA and the FCC have been working for some time to provide geocoded warnings that cellular carriers would release based on the locations of their cell towers. This has been in process well before social media got going and is just coming to fruition.

The next piece is, if you're in a hurricane warning area and an evacuation order occurs, wouldn't it make sense that your phone could tell you you're in a warning area, and this is where you need to go, here's turn-by-turn directions to the nearest shelter, all without having to go to different Web pages?

It's always based on what that threat means to you, and the directions are specific to what your needs are — not something so generic that it may not even apply to you. With broadcast information, people don't always hear which one they need to do.

You've had some interactions with volunteer groups such as Random Hacks of Kindness. How has that worked out? They said, "Give us a challenge," and I said, "[In a disaster], wouldn't it be really great if you had one app where I could just hit a button that sends out 'I'm OK,' and it would send the information to all of my lists, whether updating my Facebook status or Twitter or sending a text? Just one button, one app, boom." So they did that.

In the future, how do you envision FEMA operating, and what role will technology play? I want to tear down the walls between what we're doing with our data and our partners and the public. There's privacy issues if I'm collecting information about you for assistance. I need to keep that protected. But I'd like all of the things we're doing in trying to help people be much more transparent.

The other part is to make sure we have data feeds in a standard format so we're not seeing data entered at multiple points repetitively. We get information from the closest place where it's shared, so we don't have to call people to ask, "How many shelters do you have open?" As I update my shelter information, I'm publishing it, and you should see it in your GIS maps. Those are the kinds of things we need. FEMA can't do all of it, but at least we can be the catalyst, the grit that makes the pearl.

– *Interview by* **Robert L. Mitchell**

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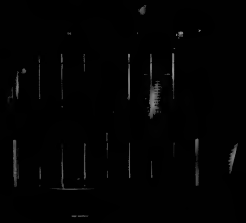
Opteron
64



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OPINION

S.J. VAUGHAN-NICHOLS

I Want My iPad at Work!

You may want to get users to standardize on one platform, but they're determined to go their own way.

DOES IT SEEM TO YOU that everyone and his brother wants to bring his own gear into the office now? You've got users who want to bring their Apple iPads to work, and others who want to use iPhones or Android smartphones instead of company-supplied BlackBerries. And someone out there has surely tried to bring in an Xbox Kinect to work on . . . uh . . . 3D motion analysis? Yeah! That's the ticket!

OK, so maybe no one has managed to get a Kinect into the office, but people are always trying to bring their tech toys to work. As Patrick Thibodeau tweeted from this year's *Computerworld* Premier 100 IT Leaders conference, "CIOs who don't support employee-owned devices, smartphones, iPads, etc., may be a minority: i.e. dinosaurs."

This isn't just talk. According to Nielsen, BlackBerry maker RIM is in a dead heat with Apple's iOS and Google's Android in the mobile operating system market, but it's losing ground. Forty-three percent of recent smartphone buyers purchased an Android device, while 26% chose an iOS-based device and 20% opted for a BlackBerry.

Of course, some employers just say no to all personal phones and tablets, though they do seem to be in the minority. And what the heck is a CIO, CTO or anyone in IT support to do? Support multiple platforms with the same budget? That's exactly what most companies seem to be trying to do. But there are no serious management tools that can handle iPads, iPhones and Android phones. Some vendors are trying to offer tools that do that, but no one has emerged as a market leader.

There are complications beyond that. Google's Android Market has real security problems, as we have painfully discovered. What's IT supposed to do? Turn off the app store functionality? How? Remove user-installed applications? I don't think so. Insist that users run only approved applications? Good luck with that! Insist that they all install an antivirus program of the company's choosing? Well, that's probably doable, but it's not perfect.

The problem isn't just the IT department's, though. Let's say an iPhone user gets laid off and the powers that be want all corporate e-mails off of his phone now. How do you deal with that? That's a good question, and I don't have a great answer. I don't think anyone does at this point.

This isn't the first time we've run into this kind of problem. In the '70s and '80s, the first PCs that appeared in many offices belonged to employees. IT tried to keep us on mainframes or minicomputers, but once you went PC, you couldn't go back.

But back then, IT faced an influx of things running CP/M and MS-DOS, which were more or less compatible with one another. Today, it's several different platforms — phones, tablets and laptops — using an even wider variety of operating systems. (Android alone had four different versions at last count.)

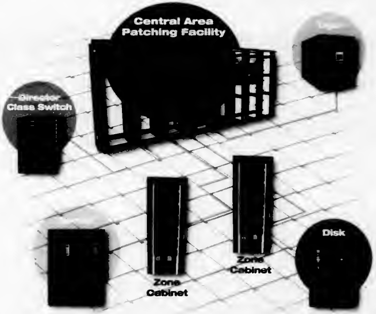
I wish I had an easy answer. I don't. You may want to get users to standardize on one platform, but they're determined to go their own way — apparently with corporate data in their pockets.

There wasn't a solution back in the day, either. Eventually, for better or for worse, IT settled on Microsoft products for the desktop, and then for the laptop. I don't see that happening this time. Microsoft's earlier success came thanks to illegal pressure on PC vendors. In this go-round, Microsoft is barely a player on the new platforms, Apple still has little interest in the business market, and everyone else is doing their own thing.

It's going to be a rough few years in the IT business. I'm just glad that although I'll be covering it, I won't be in it. Good luck, guys and gals. You're going to need it. ◆

Steven J. Vaughan-Nichols has been writing about technology and the business of technology since CP/M-80 was cutting-edge and 300bit/sec. was a fast Internet connection – and we liked it! He can be reached at sjvn@vnal.com.

Data Center Systems Solutions



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Companies in various vertical industries are taking tentative steps toward the savings, and risks, of the cloud.

BY BETH SCHULTZ

IT'S BEEN NEARLY FIVE YEARS to the day since Amazon introduced its groundbreaking Simple Storage Service — or S3, as it's more commonly known. But despite that offering's track record, many enterprise IT executives still struggle with the notion of using cloud-based storage services to hold their corporate data.

Whether they're in manufacturing, finance, healthcare or education, IT professionals are as concerned as ever about data security and privacy, with regulatory compliance weighing heavily on their minds, so they fret about sending data offsite. Likewise, they wonder if performance will be adversely affected if there's a long distance between an application and its storage site.

For reasons such as those, "we're really not seeing much willingness to put enterprise data in the cloud

yet," says Gartner analyst Adam Couture, who covers storage services.

That isn't to say that enterprises are shying away from cloud storage entirely. Many companies in vertical markets of every ilk have found the cloud to be a perfect fit for their backup, archival and file data. In other words, the cloud makes sense when speed of retrieval isn't an issue.

And Couture says the perception of the cloud's suitability as a storage medium for mission-critical data and applications will change over the years, as enterprises grow to accept public cloud computing in general.

"If you're running Amazon EC2 [the company's cloud computing service] and S3, and tbe storage is the same physical location as the server, latency becomes a nonissue, and you won't be charged every time you move the data, because it's local," he says.

Storage That's Simple

In fact, you can already find notable organizations using cloud storage in a variety of industries. Turning to the cloud is a logical move when you're involved in distributing a lot of data to a Web site, perhaps with the help of a content delivery network. Indeed, prime examples of cloud storage users are companies in media, retail and other verticals that are accustomed to finagling content delivery over the Web.

"When we think about who's using the public cloud for storage, it's really those like media companies that have need for fluctuating storage, and a lot of it. They go to the cloud, plop stuff in extra storage that they need for a certain period of time — it's a fluid resource for them," says Ruthbea Yesner Clarke, an analyst at IDC.

Streaming media is the perfect use case for public cloud storage, Clarke adds.

"That's extremely storage-heavy. It's constantly being pinged, but it also involves lots of peaks and valleys and back-and-forth flow to a main pile of storage," she says.

For example, PBS Interactive stores 90% of its streaming video content in the Amazon S3 cloud. "S3 is brain-dead simple — you put stuff in it and take stuff out of it," says Drew Engelson, chief architect and senior director of platform development at PBS in Arlington, Va.

In PBS's case, S3 is the origin server for media assets that get delivered via Amazon's CloudFront content delivery network. "We put the high-bit-rate original files on S3 for permanent storage and for ingestion into transcoding workloads. So we'll drop a high-bit-rate file into a particular S3 bucket that is being monitored by a transcoding service," he says. "The transcoding service will pick up that high-bit-rate file, transcode it into our final output format and drop those into a different S3 bucket. From there we can deliver those files through CloudFront."

It would have been possible, but difficult, to stream video content using a traditional infrastructure, according to Engelson. "We're a media organization, with a goal of delivering as much PBS content to end users as possible. We've simply found that this is one way that makes it easier to do that," he explains.

Success stories like that have helped generate interest in public cloud storage, says Couture. After all, the model does come with considerable positives — scalability up and down, pay-by-use pricing, vendor-provided management, and software agnosticism. Those qualities, of course, are particularly appealing to lean start-ups and small and midsize companies, he says.

Gartner is projecting 100% year-over-year growth in public cloud storage services for the next five years — though Couture points out that that's starting from a minuscule base. For 2011, Gartner projects that cloud storage revenue will hit $150 million to $200 million. "That isn't an extensive neighborhood," Couture says.

For example, financial services companies, by nature conservative, generally aren't going to put customer-specific data in the cloud, says Andrew Reichman, an analyst at Forrester Research. But then again, he adds, they tend to be big companies with the wherewithal to build their own data centers cost-effectively and therefore have less of a need to use the public cloud.

When you consider public cloud storage in terms of vertical industries, you have to think about security and risk, says Reichman. "Public cloud storage is certainly getting a lot of attention," he says. "But the questions are about where it can fit down the road. It's not a ready-to-go thing."

Whether public cloud storage providers thrive or wither away may depend on how well they understand two things, Reichman says: how companies in different industries use data, and how important it is for those companies to keep their data secure.

A new crop of cloud providers, including Cirtas Systems, Nasuni, Panzura and StorSimple, have developed gateway storage products designed to be flexible enough to accommodate enterprises' varying storage needs. In essence, these vendors enable users to build hybrid clouds, using local caches for data that is used frequently, must

Continued on page 24

1 Saves money
2 Provides storage skills we don't have in-house
2 Handles our peak demand times and volume spikes
4 Eases staff resources crunch

1 Puts our data at risk
2 Can't meet our regulatory compliance mandates
3 Costs more
4 Data isn't as readily available

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SUNGARD AVAILABILITY SERVICES

SPOTLIGHT

ENCRYPTION should help relieve any concerns about security and compliance that IT professionals might have when they're contemplating public cloud storage use, experts say.

"If the data is all encrypted and the keys are managed by the enterprise, then the company is pretty much protected from privacy regulations like PCI and HIPAA," says Ted Ritter, an analyst at Nemertes Research. "Physical location of the data might come into play for some companies, but really the key is to encrypt."

Gartner analyst Adam Couture agrees. "I've seen [illegible] we're HIPAA-compliant and so [illegible] storage provider needs to be HIPAA compliant too. But HIPAA says nothing about the [illegible] ture of the storage itself," he says. "It's [illegible] goosey."

What that means, according to Couture, is that regulatory concerns might affect a cloud storage decision, but the No. 1 trepidation is really security. "And for that, all I can say is if you're going to put stuff out there, you'd better encrypt it. And then at the end of a retention period, throw away the encryption keys," he says. "Your data might still be sitting out there on Amazon, but it's unusable" if it's encrypted.

Amer Khan, senior vice president of product management and development at eGistics, a Dallas-based provider of hosted document management software, agrees that it's important to encrypt data. A user of AT&T Synaptic Storage as [illegible] encrypt [illegible] moves [illegible] the storage cloud.

The company also checked out AT&T's data centers prior to committing to using its cloud storage service. "AT&T is SAS 70 Type II- as well as PCI- and HIPAA-compliant. Those are important to us," Khan says. "Historically, all the data was under our control and management. As we give that up, we have to make sure all the same types of controls are in place and that we're not dropping the level of security on that data. That's paramount to our customers."

At eGistics, the decision to use cloud storage was part of a move to cloud computing in general; it also uses AT&T Synaptic Hosting. That's not uncommon, says Ritter: "First you make the decision to do cloud computing, then you figure out how to handle the storage."

BETH SCHULTZ

Continued from page 22

be accessed quickly, requires tight security or is otherwise unsuited for the cloud, while sending the rest out to public storage.

"If a service provider can say, 'We know your workflow. We know how you deal with your customers. We know that this data is sensitive and that data is not, and we propose to do a better and cheaper job of holding the nonsensitive data for you,' then it's much more viable for that company to say, 'This offering will meet your needs,' " Reichman adds.

Data management service provider Iron Mountain, for example, has added an onsite storage option to supplement its Digital Record Center for Medical Images, a cloud storage service for medical data. The combination gives healthcare organizations greater flexibility in crafting their access and backup processes, says Iron Mountain.

But while many providers claim that their offerings enable compliance with specific regulatory mandates, there are few cloud storage services that are truly oriented to specific vertical industries, according to Reichman. "It would be hard for me to say that there is any major vertical where core applications are moving to the cloud yet," he says.

Cloud Pays Off for Accounting Firm

"Like everybody else, our storage needs are very diverse, and there are many different reasons for putting data in the cloud or not," says Peter Henley, CIO at Clark Nuber, a Bellevue, Wash.-based accounting firm.

For example, the company has solved version-control problems since it started using the cloud to store data that Clark Nuber accountants and clients closely collaborate on, he says. The firm keeps its data in Amazon's S3 cloud and has a file-sharing application from ShareFile on the front end. That setup has been a huge hit with users, according to Henley.

"We tried a highly collaborative portal, where we'd have contact lists, calendars, tasks and all that, but nobody used it — and we still needed to collaborate on file storage, or file manipulation," he explains. "We needed a place where everybody could go, and this is so simple. People see a file, they download the file, they put it back and we pick it up."

When Clark Nuber was deciding on a file-sharing provider, security was a prime consideration. "We needed a provider that was large enough — certainly larger than us — with volume on its side so it could afford a much more secure data center than we could," says Henley. "Security was an easy call, actually. Security is going to be much better at a place like Amazon than it is at Clark Nuber — we don't have armed guards outside our server room, if you get my point."

Clark Nuber clients who want data security assurances can get a SAS 70 audit report from Amazon, as well as statements from ShareFile and Clark Nuber itself on their roles in the security chain. "They're all different. ShareFile and Clark Nuber don't provide physical security for the data; Amazon does that. Clark Nuber doesn't provide any management of how the data gets to browsers; ShareFile does that. Neither Amazon nor ShareFile assigns users or has access to passwords; Clark Nuber does that," Henley explains.

Because Clark Nuber doesn't audit public companies, it doesn't have to take into account U.S. Securities and Exchange Commission mandates. But it does anyway, Henley says. For example, it ensures that data is encrypted while in transport and locked down while at rest, and it can assess audit logs should a breach occur.

Use of cloud-based file-sharing was once a competitive differentiator among accounting firms, but that's not necessarily the case anymore. "Everybody's getting into this now," says Henley.

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Continued on page 26

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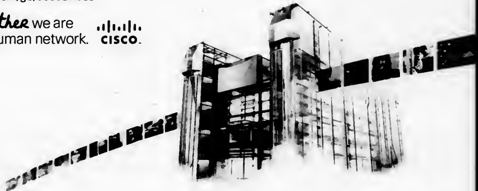

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Education Group Goes Off-campus

For WhippleHill Communications, which provides a hosted Web communications platform for private schools, the need for a better backup strategy led to the cloud, says Doug Smart, IT manager at the Bedford, N.H., company.

Today WhippleHill backs up critical data using a public cloud backup service from Zetta. The company had been backing up those files to disk and storing them in a different building on the corporate campus, Smart says. "We decided that really wasn't offsite enough for data like our source code, documentation and Wikis. We needed to get those out of here, and Zetta made it easy," he adds. He points out that Zetta helped WhippleHill write automated backup scripts and that it offers Windows sync capabilities and support for a wide variety of file system protocols — including Secure Shell FileSystem, which WhippleHill uses for Linux server backups.

Still, Smart says he's not ready to entrust highly sensitive data, such as human resources information or credit card numbers, to cloud storage. And he wouldn't change his mind on that before thoroughly investigating Zetta's policies and procedures for ensuring that its customers can meet mandates such as the those of the PCI Security Standards Council. "Frankly, I haven't talked to Zetta about encryption on its end, because it hasn't been important for what we've got out there now," says Smart, noting that the data is encrypted across the wire and protected by passwords.

Warming Up

Do you expect to move your organization's storage to the cloud?

	2011	2010
Yes	32%	19%
No	48%	61%
Don't know	20%	20%

SOURCE: EXCLUSIVE COMPUTERWORLD SURVEYS
BASE: 166 IT PROFESSIONALS, 2010; 63 IT PROFESSIONALS, FEBRUARY 2011

Local Government Alleviates Risk

Brian Moynihan, IT director for Clinton, Mich., a small town 20 miles northeast of Detroit, faced similar data storage decisions.

"Of course, we do the industry-standard backups, with multiple copies on RAID drives and online storage in vaults. But ultimately we realized the township in and of itself is a centralized location. No matter how many copies of data I have in buildings around the township, in the face of a natural disaster, we still have a single point of failure in terms of our stored data," he says.

A year and a half ago, Clinton's steering committee began exhaustive discussions about how best to address that problem. It eventually decided to turn to public cloud storage, but at that time the most readily available options were consumer-oriented offerings from Carbonite and Mozy, Moynihan says.

"We began investigating what it would take for us to do honest-to-goodness cloud-based offsite storage but didn't initially find anything that provided a real good fit for what we wanted to do, which was to have an archived, easily accessible offsite copy of our data," he says.

Then officials discovered AT&T Synaptic Storage as a Service, a pay-as-you-go storage option that was particularly attractive to the revenue-strapped municipality, Moynihan says. Although the township hasn't yet begun using the Synaptic service (Moynihan says key municipal decision-makers move at a glacial pace), it intends to rely on it for daily system backups and operational backups of financial management applications and other systems used on a day-to-day basis. Later, it will use Synaptic for long-term archiving of documents such as death records and property deeds that must be accessible, essentially, forever.

With the daily system and operational backups, Moynihan says, compliance isn't an issue. But the steering committee has concerns about the archiving. While the Freedom of Information Act requires that much of the township's historical data must be readily accessible, "that doesn't mean we want to publish everything openly on the Web," he says.

When choosing a public cloud storage provider, Moynihan says, officials had to consider where in the world the data might be kept. "For emotional and political reasons, people here don't want our data across borders," he explains.

For example, he had to rule out Google's cloud storage offering, because the company couldn't guarantee that the township's data would be stored on domestic servers. AT&T, on the other hand, identified the specific data center that would hold Clinton's data — and it said the information would be encrypted.

Pharmaceutical Firm Trusts the Cloud

At AMAG Pharmaceuticals, storage is part and parcel of a cloud computing strategy aimed at reducing IT costs and optimizing business capabilities. The Lexington, Mass., biopharmaceutical company uses Amazon's EC2 infrastructure and S3 storage services, as well as software-as-a-service options when possible, says Nate McBride, executive director of IT. "We're moving all of our storage to that environment, in two buckets — for files and e-mail," he says, noting that the company uses Egnyte's Cloud File Server on the front end for files and Google and Postini systems for storage and archiving of e-mail.

McBride dismisses common concerns about cloud storage, saying he trusts the vendors to provide better data security than his small organization, and he notes that AMAG is in compliance with all relevant federal and state mandates, including the Sarbanes-Oxley Act. Simplistically speaking, he says, it's done by not linking AMAG and its personnel with the respective data types.

For public cloud storage users like McBride and PBS's Engelson, the question seems to be, "What's the fuss?"

"Talking about S3 seems so mundane; it really has become something that I don't worry about," Engelson says. "It's really just an extension of what we do — we have to store our data somewhere, and S3 is our standard for that." ◆

Schultz *is a longtime IT writer and editor in Chicago. You can reach her at bschultz5824@gmail.com.*

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Local Government Alleviates Risk

Brian Moynihan, IT director for Clinton, Mich., a small town 20 miles northeast of Detroit, faced similar data storage decisions.

"Of course, we do the industry-standard backups, with multiple copies on RAID drives and online storage in vaults. But ultimately we realized the township in and of itself is a centralized location. No matter how many copies of data I have in buildings around the township, in the face of a natural disaster, we still have a single point of failure in terms of our stored data," he says.

A year and a half ago, Clinton's steering committee began exhaustive discussions about how best to address that problem. It eventually decided to turn to public cloud storage, but at that time the most readily available options were consumer-oriented offerings from Carbonite and Mozy, Moynihan says.

"We began investigating what it would take for us to do honest-to-goodness cloud-based offsite storage but didn't initially find anything that provided a real good fit for what we wanted to do, which was to have an archived, easily accessible offsite copy of our data," he says.

Then officials discovered AT&T Synaptic Storage as a Service, a pay-as-you-go storage option that was particularly attractive to the revenue-strapped municipality, Moynihan says. Although the township hasn't yet begun using the Synaptic service (Moynihan says key municipal decision-makers move at a glacial pace), it intends to rely on it for daily system backups and operational backups of financial management applications and other systems used on a day-to-day basis. Later, it will use Synaptic for long-term archiving of documents such as death records and property deeds that must be accessible, essentially, forever.

With the daily system and operational backups, Moynihan says, compliance isn't an issue. But the steering committee has concerns about the archiving. While the Freedom of Information Act requires that much of the township's historical data must be readily accessible, "that doesn't mean we want to publish everything openly on the Web," he says.

When choosing a public cloud storage provider, Moynihan says, officials had to consider where in the world the data might be kept. "For emotional and political reasons, people here don't want our data across borders," he explains.

For example, he had to rule out Google's cloud storage offering, because the company couldn't guarantee that the township's data would be stored on domestic servers. AT&T, on the other hand, identified the specific data center that would hold Clinton's data — and it said the information would be encrypted.

Pharmaceutical Firm Trusts the Cloud

At AMAG Pharmaceuticals, storage is part and parcel of a cloud computing strategy aimed at reducing IT costs and optimizing business capabilities. The Lexington, Mass., biopharmaceutical company uses Amazon's EC2 infrastructure and S3 storage services, as well as software-as-a-service options when possible, says Nate McBride, executive director of IT. "We're moving all of our storage to that environment, in two buckets — for files and e-mail," he says, noting that the company uses Egnyte's Cloud File Server on the front end for files and Google and Postini systems for storage and archiving of e-mail.

McBride dismisses common concerns about cloud storage, saying he trusts the vendors to provide better data security than his small organization, and he notes that AMAG is in compliance with all relevant federal and state mandates, including the Sarbanes-Oxley Act. Simplistically speaking, he says, it's done by not linking AMAG and its personnel with the respective data types.

For public cloud storage users like McBride and PBS's Engelson, the question seems to be, "What's the fuss?"

"Talking about S3 seems so mundane; it really has become something that I don't worry about," Engelson says. "It's really just an extension of what we do — we have to store our data somewhere, and S3 is our standard for that." ◆

Schultz *is a longtime IT writer and editor in Chicago. You can reach her at bschultz5824@gmail.com.*

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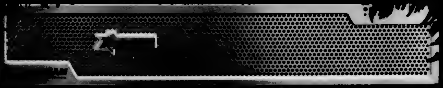

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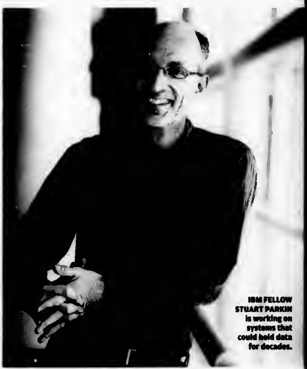
Today, long-term data storage requires constant oversight. But researchers hope cool new technologies will change that soon. BY LAMONT WOOD



IBM FELLOW STUART PARKIN is working on systems that could hold data for decades.

“MIGRATE EVERY FIVE YEARS.” That might sound like a guideline for dysfunctional birds, but it's actually a software setting that the National Film Board of Canada uses in its digital archiving system.

“The data has to be kept for infinity, so there has to be a migration process,” says Julie Dutrisac, head of research and development for the film board in Montreal, which preserves 13,000 Canadian films. “When you get into the digital domain, you are stuck migrating.”

Migration, of course, means moving the material to new storage hardware, because the old hardware can't be expected to last much more than five years, or because of expected obsolescence.

“Most storage products have a five-year warranty, and most users are in the practice of replacing their systems every five years, with infrastructures becoming completely transformed, like a snake shedding its skin, in a maximum of 10 years,” says John Monroe, an analyst at research firm Gartner. “But it has to be done without changing any data bit. People are terrified about it. It keeps IT managers up at night.”

But better sleep may be on the way in as little as five years because researchers are working to develop storage technology that should be reliable for decades rather than years, slashing the need for migration.

Racetrack Memory

Scientists at IBM, for example, are cooking up a technology called “racetrack memory,” which consists of microscopic segments of U-shaped nanowires of ferromagnetic material suspended vertically in CMOS chips. Each nanowire carries about 100 bits, encoded as nonvolatile spots of magnetism.

“I think it will be the storage Utopia,” says Stuart Parkin, an IBM fellow at the Almaden Research Center in San Jose. “There are no trade-offs.”

He foresees response times of 1 nanosecond, rather than the tens of nanoseconds of today's system DRAM. The cost should be on par with that of disk drives, but with a millionfold performance advantage. Meanwhile, racetrack units should be much more compact than hard drives, since they don't need a motor or spindle, Parkin notes.

“We move the data without moving any atoms,” he adds. “There is no mechanical motion. Instead, we are rotating magnetic moments, i.e., the direction of the magnetic field.”

The expected longevity of the data would depend on the final design of a specific racetrack system and could extend for decades. “Most magnetic devices are designed for 10 years, and ours should last at least that long,” Parkin says. But he predicts that few people would want to keep any system longer than a decade, due to the pace of technological progress.

Parkin expects to see the technology on the market in five to seven years.

IBM has other, unspecified research projects with a

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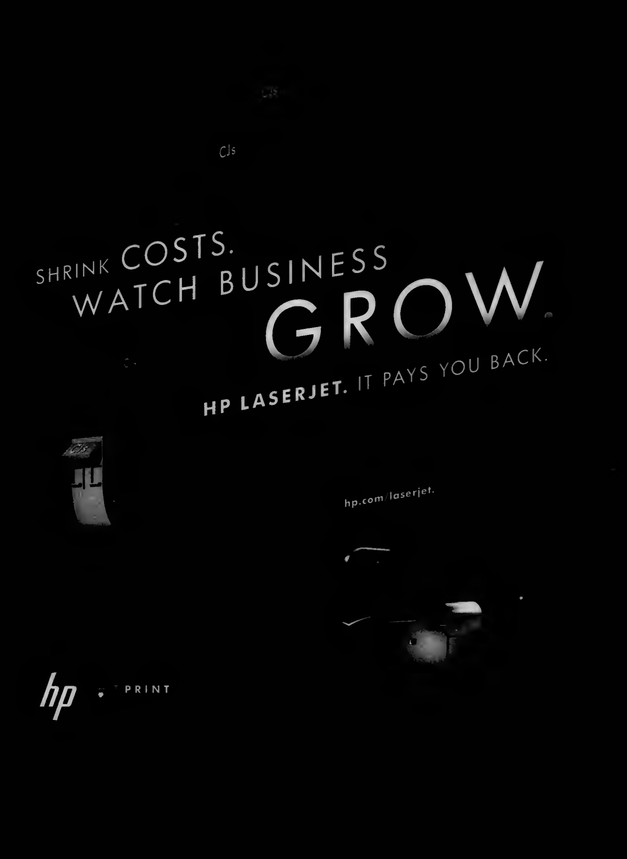
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EXPERTS AGREE that data preservation doesn't happen by itself — and this will remain the case, even with any future long-term nonvolatile, migrationless storage technology.

"It takes a lot of care and maintenance to keep digital information around," notes Alistair Veitch, director of HP's Storage and Information Management Platforms Lab. "To do it right, you need multiple copies, probably in multiple formats, and you need to audit them periodically."

Multiple formats are used for logical preservation, as a hedge against format or software obsolescence. Many organizations archive data in multiple formats, including the original format and an image format, in hopes that one will remain interpretable, says Veitch.

"Images are the lowest common denominator, and I think a straight GIF or JPG will be interpretable decades from now," Veitch says, adding that some organizations also use PDF.

Beyond that, the archive itself needs to be a fully documented, open system, especially the file system and the metadata database, so that someone could write a program to read the information in a future environment, adds Molly Rector, chairman of the board of the Active Archive Alliance and vice president at archive system vendor Spectra Logic.

"That's the big shift — the solutions were all proprietary until a couple of years ago," Rector says, adding that newer open archiving systems often aren't as feature-rich but they're significantly less expensive. As for auditing, even if the storage hardware lasts for centuries, there must be ongoing data integrity validation. "You can't just let it sit there for [illegible] and trust your archives," says Rector.

[illegible] "there is no one piece of hardware that will save us," Veitch adds, "but I think that [illegible] solid state storage that will last for decades, and I hope to see it in five years."

LAMONT WOOD

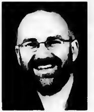
Continued from page 28

goal of developing technology that could store data for 50 years, adds Doug Balog, IBM's vice president of storage platforms. But "it's not something you'll be able to buy tomorrow," he cautions.

In the meantime, "long term, nothing is cheaper than storing things on tape, and we continue to invest in its development," says Bruce Hillsberg, head of IBM's Research Storage Systems Group at Almaden. Recent research indicates that tape cartridge capacity can be increased by a factor of 10, to 35TB, he adds.

Memory Resistors

Scientists at Hewlett-Packard are working on technology called a "memristor," or memory resistor. "We think that memristor data will have a significantly longer shelf life — 20 to 30 years at least," says Alistair Veitch, director of HP's Storage and Information Management Platforms Lab. "The lab tests look extremely promising, but it's not until we have a couple of decades of experience that we can say that it is more durable than other magnetic or optical media."



HP'S ALISTAIR VEITCH thinks data could last at least 20 to 30 years on memristor systems.

HP defines the memristor (discovered in 1971) as a fourth class of passive circuit component, joining the resistor, the capacitor and the inductor. A memristor is a device whose physical properties display a "memory" of the nature of the last current to flow through it and therefore can be used to encode and store data in a nonvolatile fashion.

Last August, HP announced a joint development agreement with Hynix Semiconductor, a South Korean memory supplier, to bring memristor products to market in the form of resistive random-access memory, or ReRAM. HP has said the ReRAM devices can be made with existing semiconductor manufacturing processes and should be competitive with flash memory in terms of price, but with higher density and faster speeds. Veitch adds that the memristors also have the potential to be used as RAM replacements. "Of course, there are caveats around proving their manufacturability, endurance, etc., that are part of our ongoing work to show feasibility, but we're cautiously optimistic," he says.

Veitch says ReRAM products should start showing up on the market in 2013.

But the ability to retrieve data after decades would be pointless if reading it required software that had become unavailable. Storing the data intact is called "bit preservation," but retaining the ability to do anything with it is called "logical preservation."

"Logical preservation is much harder than bit preservation," says Balog. An automated ability to translate data to other formats is a major component of any archiving system, but proprietary formats will defeat such software. Consequently, "there is not going to be one solution," Balog cautions.

Off-the-shelf archiving systems are available to automate part of the preservation task, especially data migration in response to set policies. The National Film Board of Canada uses a system called Digital Archive, from Atempo. In fact, says Dutrisac, the board's digitization program was built around it.

"Previously, we used a lot of backup solutions," she recalls. "But we did not have a way to catalog the files, put in metadata, and use search tools."

"Never having to migrate sounds great — everyone is dreaming of this," says Luisa Frate, chief operating officer of the National Film Board.

For now, her dream remains a dream. Scientists are working to make it a reality, but for the next few years, migration remains the answer. ◆

Wood *is a freelance writer in San Antonio.*

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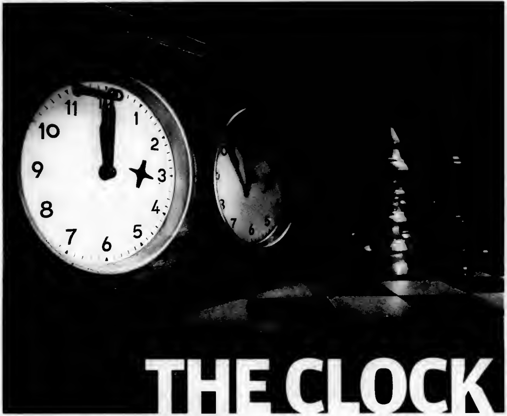

THE CLOCK IS TICKING FOR Encryption

The tidy world of cryptography may be upended by the arrival of quantum computers.

BY LAMONT WOOD

IN THE INDICTMENT that led to the expulsion of 10 Russian spies from the U.S. last summer, the FBI said that it had gained access to their encrypted communications after surreptitiously entering one of the spies' homes, where agents found a piece of paper with a 27-character password.

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In essence, the FBI found it more productive to burglarize a house than to crack a 216-bit code, despite having the computational resources of the U.S. government behind it. That's because modern cryptography, when used correctly, is very strong. Cracking an encrypted message can take an incredibly long time.

"The entire commercial world runs off the assumption that encryption is rock-solid and is not breakable," says Joe Moorcones, a vice president at SafeNet, an information security vendor in Belcamp, Md.

That's the case today. But within the foreseeable future, cracking those same codes could become trivial, thanks to quantum computing.

Before learning about the threat of quantum computing, it helps to understand the current state of encryption. There are two kinds of encryption algorithms used in enterprise-level communications security: symmetric and asymmetric, Moorcones explains. Symmetric algorithms are typically used to send the actual information, whereas asymmetric algorithms are used to send both the information and the keys.

Symmetric encryption requires that the sender and receiver both use the same algorithm and the same encryption key. Decryption is simply the reverse of the encryption process — hence the "symmetric" label.

There are numerous symmetric algorithms, but most enterprises use the Advanced Encryption Standard (AES), published in 2001 by the National Institute of Standards and Technology after five years of testing. It replaced the Data Encryption Standard (DES), which debuted in 1976 and uses a 56-bit key.

AES, which typically uses keys that are either 128 or 256 bits long, has never been broken, while DES can now be broken in a matter of hours, Moorcones says. AES is approved for sensitive U.S. government information that is not classified, he adds.

As for classified information, the algorithms used to protect it are, of course, themselves classified. "They're more of the same — they put in more bells and whistles to make them harder to crack," says IDC analyst Charles Kolodgy. And they use multiple algorithms, he says.

The genuine weakness of AES — and any symmetric system — is that the sender has to get the key to the receiver. If that key is intercepted, transmissions become an open book. That's where asymmetric algorithms come in.

Moorcones explains that asymmetric systems are also called public-key cryptography because they use a public key for encryption — but they use a different, private key for decryption. "You can post your public key in a directory with your name next to it, and I can use it to encrypt a message to you, but you are the only person with your private key, so you are the only person who can decrypt it."

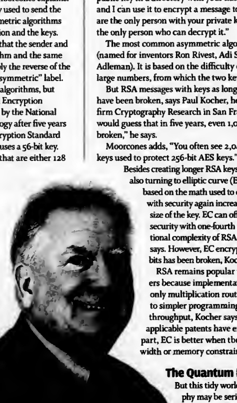
The most common asymmetric algorithm is RSA (named for inventors Ron Rivest, Adi Shamir and Len Adleman). It is based on the difficulty of factoring large numbers, from which the two keys are derived.

But RSA messages with keys as long as 768 bits have been broken, says Paul Kocher, head of security firm Cryptography Research in San Francisco. "I would guess that in five years, even 1,024 bits will be broken," he says.

Moorcones adds, "You often see 2,048-bit RSA keys used to protect 256-bit AES keys."

Besides creating longer RSA keys, users are also turning to elliptic curve (EC) algorithms, based on the math used to describe curves, with security again increasing with the size of the key. EC can offer the same security with one-fourth the computational complexity of RSA, Moorcones says. However, EC encryption up to 109 bits has been broken, Kocher notes.

RSA remains popular with developers because implementation requires only multiplication routines, leading to simpler programming and higher throughput, Kocher says. Also, all the applicable patents have expired. For its part, EC is better when there are bandwidth or memory constraints, he adds.



The **ENTIRE COMMERCIAL WORLD** *runs off the assumption that* **ENCRYPTION IS ROCK-SOLID** *and is not breakable.*

JOE MOORCONES,
VICE PRESIDENT,
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The Quantum Leap

But this tidy world of cryptography may be seriously disrupted by the arrival of quantum computers.

"There has been

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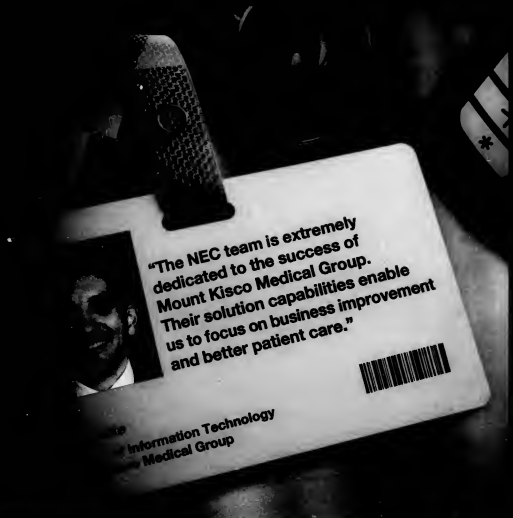
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[illegible] OF THE PROBLEM

ODAY'S ENCRYPTION ALGORITHMS can be broken. Their security derives from the wildly impractical lengths of time it can take to do so.

Let's say you're using a 128-bit AES cipher. The number of possible keys with 128 bits is 2 raised to the power of 128, or 3.4x10^{38}, or 340 undecillion. Assuming no information on the nature of the key is available (such as the fact that the owner likes to use his or her children's birthdays), a code-breaking attempt would require testing each possible key until one was found that worked.

Assuming that enough computing power was amassed to test 1 trillion keys per second, testing all possible keys would take 10.79 quintillion years. This is about 785 million times the age of the visible universe (13.75 billion years). On the other hand, you might get lucky in the first 10 minutes.

But using quantum technology with the same throughput, exhausting the possibilities of a 128-bit AES key would take about six months. If a quantum system had to crack a 256-bit key, it would take about as much time as a conventional computer needs to crack a 128-bit key.

A quantum computer could crack a cipher that uses the RSA or EC algorithms almost immediately.

— LAMONT WOOD

Continued from page 34

tremendous progress in quantum computer technology during the last few years," says Michele Mosca, deputy director of the Institute for Quantum Computing at the University of Waterloo in Ontario. Mosca notes that in the past 15 years, we have moved from playing with quantum bits to building quantum logic gates. At that rate, he thinks it's likely we will have a quantum computer within 20 years.

"It's a game-changer," Mosca says, explaining that the change comes not from improvements in the computer's clock speed, but from an astronomical reduction in the number of steps needed to perform certain computations.

Basically, Mosca explains, a quantum computer should be able to use the properties of quantum mechanics to probe for patterns within a huge number without having to examine every digit in that number. Cracking both RSA and EC ciphers involves that very task — finding patterns in huge numbers.

Mosca explains that with a conventional computer, finding a pattern for an EC cipher with N number of bits in the key would take a number of steps equal to 2 raised to one-half N. As an example, for 100 bits (a modest number), it would take 2 (1,125 quadrillion) steps.

With a quantum computer, it should take about 50 steps, he says, which means code-breaking would then be no more computationally demanding than the original encryption process.

With RSA, determining the number of steps needed for a solution through conventional computation is more complicated than with EC encryption, but the scale of the reduction with quantum computation should be similar, Mosca says.

The situation is less dire with symmetric encryption, Mosca explains. Breaking a symmetric code like AES is a matter of searching all possible key combinations for the one that works. With a 128-bit key, there are 2^{128} possible combinations. But thanks to a quantum computer's ability to probe large numbers, only the square root of the number of combinations needs to be examined — in this case, 2^{64}. This is still a huge number, and AES should remain secure with increased key sizes, Mosca says.

Timing Issues

When will quantum computing threaten the status quo? "We don't know," says Mosca. To many people, 20 years seems a long way off, but in the world of cybersecurity, it's right around the corner. "Is that an acceptable risk? I don't think so. So we need to start figuring out what alternatives to deploy, since it takes many years to change the infrastructure," Mosca says.

SafeNet's Moorcones disagrees. "DES lasted for 30 years, and AES is good for another 20 or 30 years," he says. Increases in computing power can be countered by changing keys more often — with each new message, if necessary — since many enterprises currently change their key only once every 90 days, he notes. Every key, of course, requires a fresh cracking effort, as any success with one key isn't applicable to the next.

When it comes to encryption, the rule of thumb is that "you want your messages to provide 20 years or more of security, so you want any encryption that you use to remain strong 20 years from now," says IDC's Kolodgy.

For the time being, "code-breaking today is an end-run game — it's all about snatching the user's machine," says Kolodgy. "These days, if you pull something out of the air, you can't decrypt it."

But the biggest challenge with encryption is making sure that it's actually used.

"All business-critical data should be encrypted at rest, especially credit card data," says Richard Stiennon at IT-Harvest, an IT security research firm in Birmingham, Mich. "The Payment Card Industry Security Standards Council requires that merchants encrypt it — or, better yet, not store it at all. And data-breach notification laws don't require you to disclose your lost data if it was encrypted."

And, of course, leaving your encryption keys lying around on slips of paper can also turn out to be a bad idea. ◆

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The situation is less dire with symmetric encryption, Mosca explains. Breaking a symmetric code like AES is a matter of searching all possible key combinations for the one that works. With a 128-bit key, there are 2^{128} possible combinations. But thanks to a quantum computer's ability to probe large numbers, only the square root of the number of combinations needs to be examined — in this case, 2^{64}. This is still a huge number, and AES should remain secure with increased key sizes, Mosca says.

Timing Issues

When will quantum computing threaten the status quo? "We don't know," says Mosca. To many people, 20 years seems a long way off, but in the world of cybersecurity, it's right around the corner. "Is that an acceptable risk? I don't think so. So we need to start figuring out what alternatives to deploy, since it takes many years to change the infrastructure," Mosca says.

SafeNet's Moorcones disagrees. "DES lasted for 30 years, and AES is good for another 20 or 30 years," he says. Increases in computing power can be countered by changing keys more often — with each new message, if necessary — since many enterprises currently change their key only once every 90 days, he notes. Every key, of course, requires a fresh cracking effort, as any success with one key isn't applicable to the next.

When it comes to encryption, the rule of thumb is that "you want your messages to provide 20 years or more of security, so you want any encryption that you use to remain strong 20 years from now," says IDC's Kolodgy.

For the time being, "code-breaking today is an end-run game — it's all about snatching the user's machine," says Kolodgy. "These days, if you pull something out of the air, you can't decrypt it."

But the biggest challenge with encryption is making sure that it's actually used.

"All business-critical data should be encrypted at rest, especially credit card data," says Richard Stiennon at IT-Harvest, an IT security research firm in Birmingham, Mich. "The Payment Card Industry Security Standards Council requires that merchants encrypt it — or, better yet, not store it at all. And data-breach notification laws don't require you to disclose your lost data if it was encrypted."

And, of course, leaving your encryption keys lying around on slips of paper can also turn out to be a bad idea. ◆

Wood *is a freelance writer in San Antonio.*

THE OTHER QUANTUM TECHNOLOGY

IF QUANTUM TECHNOLOGY jeopardizes the methods used to disseminate encryption keys, it also offers technology – called quantum key distribution, or QKD – by which such keys can be simultaneously generated and transmitted securely.

QKD has actually been on the market since 2004, with the fiber-based Cerberis system from ID Quantique in Geneva. Grégoire Ribordy, the firm's founder and CEO, explains that the system is based on the fact that the act of measuring quantum properties actually changes them.

At one end of an optical fiber, an emitter sends individual photons to the other end. Normally, the photons will arrive with the expected values and will be used to generate a new encryption key.

But if there is an eavesdropper on the line, the receiver will see an error rate in the photon values and no key will be generated. In the absence of that error rate, the security of the channel is assured, Ribordy says.

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However, since security can only be assured after the fact – when the error rate is measured, which happens immediately – the channel should be used to send only the keys, not ac messages, he notes.

The other limitation of the system is its range, which currently doesn't exceed 100 kilometers (62 miles), although the company has achieved 250 kilometers in the lab. The theoretical maximum is 400 kilometers, Ribordy says. Going beyond that would require the development of a quantum repeater – which would presumably use the same technology as a quantum computer.

QKD security isn't cheap: An emitter-receiver pair costs about $97,000, Ribordy says.

– LAMONT WOOD

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Security Manager's Journal

MATHIAS THURMAN

Developing a Metrics System

Trouble Ticket

» You don't know where some dangers lurk unless you look for them.

» Develop a regular program of metrics, and find an interesting way to present them to the CIO

METRICS CAN HAVE a very interesting effect. You just have to present them properly.

I spent the past week deciding which metrics I want to collect and present to the CIO on a quarterly basis, and how I will present them. I'm using Microsoft SharePoint to collect my metrics and will export the results to an Excel spreadsheet so that I can create some interesting pivot tables and charts. The idea is that I simply have to input the data, and the resulting presentation will be automated. I can even incorporate the Excel charts into PowerPoint so that I only have to open the presentation each quarter and the data will be updated automatically. And, if I can pull it off, I can have some of the metrics automatically populate my SharePoint list. Gotta love automation!

To begin with, I'm conducting discovery scans on the entire enterprise to identify the total number of devices (beginning with PCs and servers) connected to the network. I'm using Nessus to conduct these scans, since it's a fairly robust independent tool. The price is reasonable for a one-year license, and it lets us scan our entire address range. I'm also using Altiris, which is a Symantec tool that we use for software distribution and reporting. And finally, there's Symantec AntiVirus Server for reporting on antivirus compliance.

Initial results are alarming. Our company has about 3,000 workers (including contractors). You would think that a discovery scan of desktops would yield about 3,000 unique desktop-class PCs, with workers who are not in the office offset by those who have more than one PC. Our result: 4,200 PCs! Next, I generated a report to see how many of those PCs have the Altiris Agent installed so that we can control the configuration. Only 2,400. This means there are 1,800 PCs whose integrity we can't vouch for. And any unmanaged resource represents risk.

the discussions about security! **computerworld.com/blogs/security**

I did the same for servers. I obtained all the IP address spaces for each data center and remote office and conducted discovery scans of all resources that looked like they were running a server operating system. The result: 1,200 servers (including virtual machines). Next, Altiris reported only 800 servers, leaving 400 that we know nothing about. And 30 of those servers are in our DMZ!

Besides reporting the ratio of managed to unmanaged devices, I will be reporting on how many of those devices are in compliance with our patch management policy. We apply Microsoft patches one month after they are released, giving us time to test different environments and applications. I'll also report on the number of resources that are in compliance with our antivirus/spyware policy, meaning they have the most updated software and pattern file.

And finally, I'll report on security events. Why? Because I need to show the direct correlation between security events and lack of compliance in order to drive change. I guarantee that unless you have other compensating controls in place, such as IPS or other activity-blocking infrastructure, incidents rise when resources aren't patched or in compliance with antivirus policy.

My plan is to report to the CIO every quarter on the number of managed and unmanaged devices, and the data related to patches, antivirus and incidents. This will make him aware of the status of the environment (after all, the CIO is ultimately responsible for IT) and hopefully drive change in our risk exposure. Will I be the most popular guy in the room? Probably not. Are these metrics relevant? Absolutely. And until we implement network access control to interrogate each and every device that is attached to our network, we will continue to have issues in this area. ◆

I need to show the direct correlation between security events and lack of compliance in order to drive change.

This week's journal is written by a real security manager, **"Mathias Thurman,"** *whose name and employer have been disguised for obvious reasons. Contact him at mathias.thurman@yahoo.com.*

Security Manager's Journal

MATHIAS THURMAN

Trouble Ticket

Developing a Metrics System

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OPINION

BART PERKINS

The Variables Determine The Value of Variable Cost

There are other advantages to flexible cost structures beyond the financial ones.

A RECENT *COMPUTERWORLD* ARTICLE asserted that "CFOs like the pay-as-you-go economics of cloud computing." And in uncertain economic times, many companies prefer a flexible cost structure that lets IT rapidly match capacity to business needs. But financial benefits aren't the only advantages of these setups.

Demand management. IT services are never free, even if other departments aren't charged. Unfortunately, when there is no budget impact, business units are often casual about the IT products and services they consume. They demand status symbols like iPads, big monitors and the latest smartphones. They provide minimal justification for requested IT applications. They fail to turn off mailboxes or return laptops when people leave.

Even in companies without chargeback systems, equipment leasing and cloud services offer effective ways to track usage of IT services. Most providers offer detailed bills that track consumption by product, service and business unit. IT and Finance can collaborate to identify business units with high consumption levels. Most finance organizations are happy to follow the money in this way and demand justification or reduced consumption.

Physical asset tracking. Fixed-asset systems account for equipment depreciation. However, many companies have a difficult time tracking physical devices. Desktops and laptops move around in order to support staffing changes and organizational realignment. Server centers regularly reconfigure equipment to accommodate workload changes. Processors, memory and other components are often altered to extend a system's useful life, repair faulty equipment or increase user productivity. It's a nightmare! Worse, disappearing computer equipment increases the potential for data breaches.

Leases offer a compelling rationale for demanding that business units track equipment. Equipment must be returned at the end of the lease; it must be tracked accurately or the company will be charged for lost items. (Even if lost equipment is not charged to the offending business unit, IT has a strong argument for the CFO for budget relief.)

Technology refresh. The point-of-sale equipment in one Fortune 500 company was so old that IT had to scavenge parts from used POS stations that were being decommissioned by other companies (often searching eBay to find the right models). IT then invested significant time and resources to repair broken POS terminals. Since IT labor was not charged to store operations but depreciation for new POS devices would be, store operations had little incentive to replace the old equipment. Eventually, the CIO convinced the CFO to lease IT equipment, eliminating the temptation to operate expensive and obsolete devices.

Some organizations believe that fully depreciated equipment is free in a way. They're reluctant to replace it even when its maintenance costs are enormous and its dated capabilities hamper productivity. In contrast, leasing companies upgrade equipment at predetermined intervals, conveniently eliminating out-of-date equipment and battles over budgeting for technology refreshes.

Besides financial flexibility, variable cost mechanisms provide IT with an effective vehicle for tracking resource consumption. These mechanisms also provide many of the controls and decision-making benefits of chargeback without its significant investment or overhead. Finally, IT can deflect complaints, attributing the imposed controls to the leasing/cloud company. This time, someone else gets to be the bad guy. ◆

Bart Perkins is managing partner at Louisville, Ky.-based Leverage Partners Inc., which helps organizations invest well in IT. Contact him at BartPerkins@LeveragePartners.com.

Career Watch

Q&A

Steve Watson

[illegible]

Stanton Chase International

As the U.S. looks to address its fiscal challenges, how likely is it that we will see an increase in the retirement age? I personally believe it will be increased for various entitlement programs, with grandfather clauses for those close to retirement age.

Many older IT workers who have lost their jobs say companies favor hiring younger IT workers. If the retirement age is pushed back to 70 or more, will these people just spend more years underemployed? I am seeing an openness on the part of employers to look at more experienced people (those in their late 50s and early 60s) who demonstrate energy and a willingness to travel and do what it takes to get the job done. I think more experienced people have better opportunities today than they did 10 or 15 years ago, thanks to the demand for experience, leadership and good management skills. One client recently told me he had interviewed a candidate who was in his early 70s.

MORE OLDER AMERICANS ARE WORKING

The percentage of Americans age 55 or older who are in the labor force has been on the rise since 1993 and in 2010 exceeded the percentage recorded in 1975. For older workers who haven't reached retirement age, the higher rate of labor participation can be attributed to an increase the number of women in the workforce. But the percentages of both men and women in the workforce who are 65 or older has grown. Education level has a strong correlation with a higher labor-participation rate.

Year	Labor participation rate of workers 55 and older
1975	34.6%
1993	29.4%
2010	40.2%

What accounts for this change? Companies tend to hire younger to get a return on investment. A younger person might be able to contribute for 10 to 15 years, be part of succession planning and add bench strength. Nonetheless, companies today are recognizing that if they can get five to 10 years of good performance, then the investment is good. This is different thinking than 15 or more years ago, when companies were really looking for more long-term commitment. But they accept the reality that people today move on more quickly than they did in the past, especially the younger generation.

Among employers, there's a new emphasis on developing better retention vehicles and a culture that offers work/life balance and a more purposeful life through things like giving back, pursuing green initiatives and conservation, and promoting community service. But sometimes a company has a pressing need that can best be addressed by hiring a more experienced person. The company may need someone who can quickly grow revenue, enter new markets, take a new product to market, expand globally, develop and lead a young team, implement a new system, integrate a new business, or leverage new technology, and may feel that only someone with a wealth of experience can deliver what is needed. The company may also want the experienced hire to mentor and develop a successor.

An example from my practice is a start-up business that is looking for a vice president of sales and is seriously looking at an experienced candidate whose age is around 60 and who has industry contacts, knows the distribution channels and can build a high-performing team quickly. The client's interest in the more experienced candidate is to get revenue, new customers and a team quickly.

— JAMIE ECKLE

Where the Jobs Are: Healthcare

As hospitals gear up for full implementation of electronic health record systems, they are facing a significant shortage of qualified IT personnel. Accenture conducted a study on EHR implementation and concluded that the push for electronic records will require one full-time healthcare IT worker for every five hospital beds. That translates into a need for roughly 155,000 full-time healthcare IT workers in the U.S., which is some 45,000 more than the current number of IT professionals in healthcare, according to a Gartner estimate.

[illegible]

Number of additional healthcare IT workers that will be needed in the U.S. over the next five years.

FOTOLIA DIANA DAV

Career Watch

Q&A

Steve Watson

The managing director of the Dallas office of executive search firm **Stanton Chase International** *discusses changes in prospects for older workers.*

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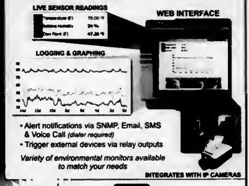

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This Notice is being published because a settlement has been proposed by all parties in the following class action matters pending in the United States District Court, Central District Of California, Western Division:

In Re Quantcast Advertising Cookie Litig., No. 2:10-cv-05484-GW
Davis v. VideoEgg, Inc., No. 2:10-cv-07112-GW
In Re Clearspring Flash Cookie Litig., NO. 2:10-CV-05948-GW

WHAT IS THIS NOTICE FOR?

This Notice is being published by order of the Court, before the Court considers final approval of the proposed Settlement, and is meant to inform you of actions you may take in response to the proposed Settlement.

- You may do nothing and be bound by the Settlement, if the Court approves it.
- You also may object to the proposed Settlement, or opt out of it, by following the instructions in this Notice.
- The Court will hold a hearing about the Settlement, which you may attend.

This Notice summarizes some of the information related to the proposed Settlement. For more details, go to www.flashcookiesettlement.com.

WHAT ARE THESE LAWSUITS ABOUT?

Quantcast Corporation, Clearspring Technologies, Inc., VideoEgg, Inc. and other companies allegedly deposited browser "cookies" and Adobe Flash Player local shared objects (LSOs) on users' computers when users visited any of tens of millions of pages on the Internet. (VideoEgg does not use browser cookies). Browsing programs may not manage LSOs, so LSOs may be deposited even when users set their browsers to block browser cookies. Plaintiffs allege that, in some cases with some defendants, after users deleted browser cookies, information from LSOs was used to "respawn" those deleted browser cookies.

The Plaintiffs allege that the Defendants and their affiliates did not give users adequate notice and choice about their use of LSOs. The Defendants deny this.

WHAT DOES THE SETTLEMENT DO?

The proposed Settlement would resolve these lawsuits before the Court takes a position on which side is right.

As part of the Settlement, Quantcast, Clearspring, and VideoEgg state that they do not and will not use LSOs to respawn browser cookie information to serve as an undisclosed alternative to browser cookies for tracking users online, or otherwise to counteract users' decisions to block or delete browser cookies. Other defendants and their affiliates agree to take significant future measures to enhance consumers' online privacy.

This is not a Settlement in which Class Members will receive compensation directly. Under the proposed settlement agreement, subject to Court review and approval, Quantcast, Clearspring, and VideoEgg together will contribute $3,225,000 to two Settlement Funds. After payment of attorneys' fees and costs (no more than $806,250), small payments to the representative plaintiffs and administration costs, the bulk of the Settlement Fund will be distributed among Court-approved non-profit groups engaged in research and education that promote consumer awareness and choice regarding privacy, safety, and security of the electronic information.

AM I AFFECTED?

Quantcast, Clearspring, and VideoEgg technologies have been used on tens of thousands of web pages, including the heavily-trafficked websites of the Defendants and their affiliates. For these reasons, **substantially all U.S. persons who have used the Internet since June 1, 2008, likely are members of the class** Clearspring LSOs can be identified by a filename of "clearspring.sol." Quantcast LSOs can be identified by filenames that include "____qca.sol" or "Quantserve." VideoEgg LSOs can be identified by filenames that include "admanager sol" that originated from core.videoegg.com.

WHAT ARE MY OPTIONS?

***Do nothing*:** If you are a Class Member and do nothing, you will be legally bound by the Settlement, and you will be giving up the right to sue the Defendants or their affiliates over claims related to or arising out of the use of LSOs

***Opt out*:** If you do not want to be legally bound by the Settlement, you must exclude yourself, as to Quantcast and Clearspring by May 13, 2011, or, as to VideoEgg, by June 10, 2011, or you will not be able to sue the Defendants and their affiliates for the claims listed in the settlement agreement.

***Object*.** If you wish to object to the terms of the settlement, you *must* file your objection as to Quantcast and Clearspring by May 13, 2011, or, as to VideoEgg, by June 10, 2011. Only members of the Settlement Class who have not opted out may object to the settlement.

Opt-out elections and objections must be received no later than the above-stated dates at this address:

Flash Cookie Settlement Claims Administrator
c-o Rosenthal & Company LLC
P.O. Box 6177, Novato, CA 94948-6177

***Attend the settlement hearings*:** On June 13, 2011, at 9:30 a.m., the Court will hold a hearing to consider granting final approval to the proposed Settlement as to Quantcast and Clearspring. The Court will hold a hearing as to the VideoEgg settlement on July 18, 2011 at 9:30 a.m. You do not have to attend either hearing

For a full copy of the Notice of Settlement and details on required procedures, deadlines, and your options and obligations, visit *www.flashcookiesettlement.com.*

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IL4068 – Sftwr Developer, Team Lead
IL4064 – Hrdwr Designer
Research in Motion Corporation (US), Bellevue, WA, positions are avail:
WA4069 – Carrier Tech Mgr
Submit resume to Research in Motion Corporation (US), to PO Box 141394, Irving, TX, 75014-1394, ref approp job title & req number.

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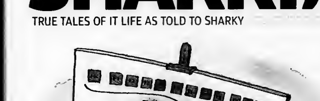

Just Like You Told Me

User has been issued a new notebook computer, and he calls this support pilot fish when he can't log in. "The user told me his password wasn't working," fish says. "He explained that the notebook would be no good for him, or the password would have to change. Why? I asked. 'Because I can't enter my password,' said the user. 'The password has a 44 in it and the notebook doesn't have a keypad, so it can't be entered.' Hmm, I said, why not just use the numbers on the top row? The user tried, then told me, 'It still didn't work.' I logged on remotely with his log-in and password. It worked fine for me. I asked the user to try again. Still no luck for him. Then he asked if the 'F' in front of the 4 could be making a difference. What 'F'? I asked. Turns out he was using the top row. The function keys. It's all working fine now."

Not Her Type

Trouble ticket comes in from a new employee who's having problems logging in. "I headed down to where she was," says pilot fish who answers the call. "When I got there, I noticed she was sitting at a supervisor's desk. She told me that he said it was OK for her to use his PC, since they didn't have a spot for her yet." Fish tries the password, watching the screen as he types. It works fine. Now you try it, he says. She does – and gets an error message that her log-in information is incorrect. Fish tries again, and it works. User tries and it doesn't work. Try it again, fish says – and this time he watches her hands closely. As she types a character at the lower left side of the keyboard, he stops her. What letter did you just type? he asks. "O," says user. Show me the "O" key, says fish. She points to the lower-left area of the keyboard at the "O" key – right where the "X" key should be. "And then I see it!" fish says. "Eight keys on the bottom row of the keyboard are not what they should be, but spell out the name of the supervisor who uses this PC. I told the user that there was a problem with the keyboard and I'd be replacing it. After I did, she no longer had issues logging in. As for the supervisor, he got a reprimand for modifying company computer equipment."

Unclear on The Concept

This company has a standard procedure for dealing with things like printers that need supplies – and judging from calls to the help desk, it's clear that users are aware of it, reports a pilot fish there. Fish: Hello, this is the help desk. User: "The printer up here needs toner." OK, what printer is it? "It's the HP 4050." All right, I'll be up soon. "I'll e-mail the help desk too, like you always ask us to."

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PAUL GLEN

IT, the Business and The Clash of Cultures

AFTER MORE THAN 10 YEARS of focusing on the organizational, structural and managerial issues inside technical groups, I've started shifting my attention to the boundaries of our groups, to the relationship between IT and the rest of the business.

And after months of research and talks with IT leaders, what has surprised me most is how little progress we seem to be making in improving our external relationships. While business groups need IT more than ever, the levels of mutual trust remain low and frustration remains high.

I think there are some important things we need to recognize to make more progress.

There is no such thing as "the business-IT relationship." We've developed shorthand phrases for discussing our relationships with the various consumers of technology we serve. Because our users are so diverse, we've needed a way to conceptualize us and them in a simple way. But this is a dysfunctional oversimplification. There is no one who self-identifies as "the business."

There are a variety of functional groups within our organizations that use our products and services, but they are quite different from one another. Finance groups are not like sales groups. Logistics groups are not like marketing. Manufacturing is nothing like human resources. Our relationships with all need to be tended differently.

The most difficult challenges in these relationships are cultural rather than technical or procedural. The methods we have been using to try to work more effectively with our consumers all have one thing in common: They focus on everything other than the relationship itself. Think about it. IT governance and portfolio management focus on using processes to improve the relationship. Project management focuses on tasks.

These are all important, but they minimize the human part of the equation. The biggest challenges are cultural, not procedural or technical. The groups we serve have different subcultures from ours, and the clash of these cultures leads to miscommunication and an inability to understand one another's priorities.

The cultural clash between IT and each functional unit is complicated by their response to technology, and not just to us. Business relationships are about more than the sum of the activities and services exchanged between individuals and groups. There are feelings involved. And the feelings that IT consumers have about us are not just about us. It's difficult for them to separate their feelings about technology from those about the people who select, build and support it for them.

I'm sure we've all seen cases in which users resist a new technology. This is usually attributed to fear of change, but this is just an oversimplification and is dismissive of their concerns. They often resist new technology because it violates some aspect of their deeply held beliefs about how the world does or should work. It conflicts with their priorities or their assumptions about their role in the organization.

These are culture conflicts of a different sort, but culture conflicts nonetheless. Rare are the IT consumers who can articulate their unhappiness with the technology itself rather than with those of us deemed responsible for bringing it to them.

If we are going to progress in the hard work of building and maintaining cross-functional relationships, we need to start thinking more about our own culture and those of our users. Now that IT is ubiquitous, we must acknowledge the human challenges that delivering technology brings. ◆

While business groups need IT more than ever, the levels of mutual trust remain low and frustration remains high.

Paul Glen is a consultant who helps technical organizations improve productivity through leadership, and the author of the award-winning book *Leading Geeks* (Jossey-Bass, 2003). You can contact him at info@paulglen.com.

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